G-4 NEWS

Volume 7 Issue 2 *The Newsletter for Oxygen Compatibility Practitioners* Fall 2000

Special 25th Anniversary Edition

"Oxygen 2000" Scores Big!

The City of Lights welcomed more than 70 oxygen practitioners in search of the very latest knowledge in their art September 27 through 29 at the Palais de Congres.

Cochairmen Theodore Steinberg (Univ. of Queensland), Herve Barthélémy (Air Liquide), Harold Beeson (NASA WSTF), and Barry Newton (Wendell Hull & Assoc.) guided the presentation of 30 papers for the ASTM Committee G-4's Ninth International Symposium on Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres (9IS).

The papers comprised most of the material published in a new ASTM Special Technical Publication 1395, available now ($144 for members, $160 for nonmembers). Paper topics include material selection, ignition and combustion of nonmetals, ignition and combustion of metals, analysis of ignition and combustion, failure analysis and safety, and structured packings for air separation

*(See **Oxygen 2000** on page 8)*

Progress at Paris:

...Now for the Next 1000 Years!

The G-4 Fall 2000 business meeting was hosted by Air Liquide, Paris during the two days preceding the Ninth International Symposium.

Main Committee G4.00 reported that the Committee may be a pilot group for balloting by email in the future. Coleman Bryan announced that his Award of Merit Nominating Committee would submit a candidate by the 01 November deadline. The availability of papers was queried to assess scheduling of the next International Symposium at the Fall 2002 meeting. Ted Steinberg and Michael Yentzen agreed to serve as editors for the next STP. Hervé Barthélémy was commended for his outstanding efforts in making the arrangements for the Paris meeting. Finally, fourteen new members were added to G-4's roster.

Test Methods G4.01 completed the ballot of the provisional medical oxygen regulator standard (see article this page). G 124 on Promoted Combustion, G 125 on Oxygen Index, G 72 on Autoignition Temperature, and G 74 on Gas Impact were all revised.

Practices G4.02 assembled a task force

*(See **Progress** on page 7)*

Inside This Issue

The Eiffel Tower, Crepes, and Paris . . . Finally!

G-4 has long sought to meet in Paris for a symposium. Paris had been scheduled as the site for the 1990 Fifth International Symposium, but many factors, including the Gulf War, conspired to thwart it. That was a crushing disappointment for a committee seeking international scope and especially for Coleman Bryan, G-4's chairman at the time, who grew up in France as an "Air Force Brat."

This time Coleman provided the Keynote Address at the Oxygen 2000 symposium. Bob Lowrie, also a former commit-

*(See **Crepes** on page 2)*

Provisional Regulator Standard Approved

The oxygen regulator standard was given provisional status at the G-4 Fall business meeting in Paris, with minor editorial issues resolved during the proceedings.

PS 127, Standard Test Method for Evaluating the Ignition Sensitivity and Fault Tolerance of Oxygen Regulators Used for Medical and Emergency Applications, will be available from ASTM soon.

In support of bringing the standard to full consensus status, a round robin test series has been developed and distributed to G-4's Medical Oxygen Regulator Task Group for review.

Its objectives are to answer the following questions:

*(See **Regulator** on page 2)*

PCTFE Task Force Progress Report

The task force continued evaluations on PCTFE mechanical and dimensional instability on the single batch of M400h Neoflon resin that was supplied by Daikin America. Afton Plastics and Acutech (Nalge Process Technologies) have molded the polymer for dissemination to several component manufacturers. Both extrusion and compression molded material from this batch of resin were received.

This molded material was then sent to Victor Equipment, Tescom, Jim Davenport, Sherwood, Carleton Technologies, NASA-WSTF, and Air Liquide for either material properties testing, oxygen compatibility testing, or machining into typical component seats.

Machined seats were received from Victor Equipment, Tescom, and Jim Davenport. These seats were then sent to NASA-WSTF for postprocessing property evaluations.

One sample of each material had been tested when the table below was prepared. **G4N**

	Rod Dia. (in.)	ZST	AIT (ºC)
Afton Plastics			
Compression Molded	3/4	407.1	412
Compression Molded	3/16	414.2	411
Extrusion Molded	3/4	392.2	352
Extrusion Molded	3/16	409.9	362
Acutech			
Extrusion Molded	3/4	276.4	416
Extrusion Molded	3/16	205.0	348

*(**Crepes** from page 1)*

tee chairman, presented a review of G-4's twenty-five year history (See p. 3) at a wine-and-cheese gathering on the afternoon of the second day of the symposium.

Several anniversary mementos were given out at the gathering, including portfolios and oxford shirts emblazoned with an embroidered G-4O_2 logo, 20th anniversary G-4O_2 medallions, and lapel pins.

Finally, symposium attendants were treated to sumptuous lobster and mango salad, filet mignon, and chocolate *gateau* for dessert at a dinner in the Eiffel Tower.

The banquet and ceremonies preparations were the hard work of Steve Mawn and Master of Ceremonies Bill Royals. **G4N**

*(**Regulator** from page 1)*

- Can the ignition pill be manufactured reproducibly? What are the tolerances on pill dimensions, mass, and heat of combustion?
- Does an ignition pill manufactured at one laboratory ignite repeatably on the first pneumatic impact in the test apparatuses at various laboratories?
- Are the pass/fail results of various regulators reproducible at various laboratories?

A reliable ignition pill has been difficult to develop. Early concern was expressed over the use of an adhesive, (rubber cement or super glue), used to seal the pill. The technique has been refined to eliminate the need for such an adhesive.

Pill manufacturing instructions have been written, and drawings will accompany them when pill materials are distributed to the test laboratories.

The task group intends to present preliminary results to the Committee during its Spring 2001 meeting. **G4N**

Visit the G-4 Web Site at

http://www.wstf.nasa.gov/Oxygen/ASTMG4/default.htm

A new web site is under construction; it's scheduled to be on line before the Spring 2001 meeting.

CGA/EIGA Piping Guide Makes Progress

The EIGA/CGA Oxygen Pipeline Standard Harmonization Effort was initiated to merge the requirements of CGA G-4.4, "Industrial Practices for Gaseous Oxygen Transmission and Distribution Piping Systems," and IGC 13/82, "The Transportation and Distribution of Oxygen by Pipeline." The effort, which commenced in October 1999, has made significant progress over the past year.

The CGA/EIGA Oxygen Pipeline Standard Harmonization Task Force recently met in Brussels, Belgium and reports the following accomplishments to date:

- Preparation of the new specification's Table of Contents
- Review of basis and application of present CGA G-4.4 pressure/velocity (PV) curve
- Establishment of new PV curve
- Preparation of exempt material tables that will specify minimum thickness and maximum exemption pressure for various Cu-Ni, SS, and ferrous alloys
- Preparation of a 70-page draft of the complete EIGA/CGA oxygen pipeline standard

The EIGA/CGA harmonization task force currently consists of the following members: Emmanuel Fano, Task Force Chairman, and Eric Fortuit, Task Force Facilitator, Air Liquide (France); Jim Campbell, Kim Dunleavy, and Lawrence Schmidt, Air Liquide (US); David Castillo, Air Products (US) and Phil Cook and Stuart Hargreave (GB); Hermann Herbort, Linde Gas (Germany); Ed Simon, BOC Gases (US) and Terry Knight (GB); Klaus Krinninger and Sabine Sievers, Messer (Germany); Hermann Puype, EIGA (Belgium); Lars Spangberg, AGA (Sweden); Gerry Unger and Bob Zawierucha, Praxair (US) and Javier Moreno Torres (Spain).

The final document is expected to be completed by Spring 2001.

Special Feature:

ASTM G-4 is 25 Years Old!

Robert E. Lowrie, who retired from BOC, was ASTM Committee G-4's fourth chairman. He served from 1986 through 1989 and won the Award of Merit in 1993, among his many other accomplishments. Bob was also one of G-4's most literate members, a good reason why Chairman John Cronk appealed to him to prepare a history of the Committee for the twenty-fifth anniversary celebration. We're thankful that he took on the challenge. The result is thirty-two pages of facts, nostalgia, and fascinating trivia from his keen observations of this memorable span of time.

The printed history was provided to each attendee of the Paris symposium and is a must-read for anyone who wishes to learn to how we got to where we are today. While supplies last, copies will be provided to all new members of the committee and as many charter members as can be located. Everyone else can read or download the full document from the G-4 Web Site at http://www.wstf.nasa.gov/Oxygen/ASTMG4/default.htm.

We can only overview this monumental work for you here.

Bob couches his commentary in terms of heroes who have served the committee's good works, and there were many. Alas! Only a few can be recognized here. Figure 1 shows our patriarchs: Abraham Lapin (receiving an Award of Appreciation from our first chairman, Leonard Ball) and John Gilbertson. The vision and hard work of these men led them to recognize the need for G-4, and then they set out to make it happen. Table 1 lists some of the people who helped shoulder the leadership burden at their lead.

It has been a productive twenty-five years, perhaps a model for how Committees should operate within the ASTM system. Table 2 shows a timeline of our principal accomplishments: a steady stream of progress.

We should point out that G-4 has worked towards a "Compleat Oxygen Compatibility System." As with most committees, G-4 built an expected system of standards (twenty practices, test methods, and specifications at present) but then went on to develop experimental data (in three separate test programs to date), a symposia and seminar system (which has produced nine Special Technical Publications [STPs] and hosted nearly 300 scholarly papers), developed reference and computer tools, and perhaps the crown jewel that makes it all work: the Committee's award winning state-of-the-art Technical and Professional Training (TPT) course: *"Fire Hazards in Oxygen Systems."*

FIG. 1—Early G-4 leaders include Abraham Lapin (top photo-left) and John Gilbertson (bottom photo). Presenting the award is first chairman Leonard Ball (top photo-right).

TABLE 1—*G-4 Leadership*
(Some dates are approximate)

Humblest apologies for omissions.

Chair
75-77 W. Leonard Ball
78-81 Richard Steenrod
82-85 Barry L. Werley
86-89 Robert E. Lowrie
90-95 Coleman J. Bryan
96-01 John O. Cronk

G4.01 Test Methods
75-76 Paul Ordin
76-00 Coleman J. Bryan

G4.02 Practices
75-82 Robert Neary
83-83 Ed Volland
86-88 John O. Cronk
89-96 Ken McIlroy
96-00 Ting C. Chou

G4.03 Terminology
90-95 Dale Ruesch
95-00 Harold Beeson

G4.04 Long-Range Planning
80-83 Bob Lowrie
83-85 Keith Miller
96-00 Paul Klein

G4.05 Education
85-92 Jack S. Stradling
92-96 Barry L. Werley
96-00 Michael Yentzen

G4.92 Research
94-00 Ted Steinberg

G4.93 Statistics
95-00 Barry Newton

G4.94 Publicity
86-00 Barry L. Werley

ASTM Staff Liaison
75-80 Jack Bystrom
80-81 Frank Giorgilli
81-83 Phil Lively
84-88 Robert Waller
89-00 Steve Mawn

Besides these good works, G-4 also invented its own system for doing these things efficiently — no small task. Figure 2 shows the earliest known photo of the

*(See **25 Years** on page 4)*

TABLE 2—*G-4 Timeline*

’75—G-4 Formed
’80—First G 63 Nonmetals
’82—First G 72 AIT
First G 74 Gas Impact
First symposium
’84—First G 86 Pressurized Impact
First G 88 System design
’85—Second symposium
Education Committee formed
’86—Metals test program
’87—First G 93 Cleaning
First G 94 Metals
Third symposium
’89—Fourth symposium
’90—First Education Course
First Computer Bulletin Board
’91—Fifth symposium
’92—Cleaning symposium
First seminar
’93—First G 114 Aging
First G 120 Soxhlet test
First G 121 Test coupons
First G.122 Cleaning agents
Sixth symposium
’94—First G 124 Promoted combustion
First G 125 Fire limits
First G 126 Terminology
First *G-4 News*
Research Committee formed
’95—First G 127 Selecting agents
First G 128 Control hazards
First G 131 Ultrasound cleaning
First G 136 Ultrasound extraction
Seventh symposium
First PC utilities
Statistics Committee formed
’96—First G 144 Total carbon analysis
First G 145 Incident study
First Web Site
’97—First ISP thick SS tests
Summit with SAE A-10
Eighth symposium
First standards compilation
’98—First short course
G-4 Committee featured in
Standardization News
’99—Second ISP high-temperature tests
First ASTM Manual (#36)
’00—Ninth symposium
25 yr. History published

And the beat goes on…

*(**25 Years** from page 3)*
committee.

Our symposia series has been very successful and has been keynoted by the heroes in our committee and the field at large (Table 3).

Today G-4 manages and maintains a compelling body of work. More impressively, it continues to build upon it in breadth and depth.

FIG. 2—Oct 1980 tour of Kennedy Space Center before the first Space Shuttle had flown. This is the earliest known photo of G-4 — taken just as bell-bottoms were on their way out!

Standards are regularly revised. In some cases (G 63, G 93) standards have been extensively revised and expanded.

International symposia and similar seminars conducted in concert with G-4’s meetings are regularly hosted. Ten STPs have captured many papers from these symposia and seminars as well.

To illustrate G-4’s commitment, for fifteen years (1982-1997) the Committee struggled to invent a procedure that allowed for distribution of its STPs at their related symposia. This feat was first accomplished in 1997 and repeated in 2000. In combination, these symposia and seminars have produced the most valuable resources in existence for this field.

Commitment was also manifest when in the 1980s, there were insufficient data available for a standard on metals evaluation. A test program was designed, funds were solicited, and testing was commissioned at NASA White Sands Test Facility. Today, G 94 is the result. Further, additional programs are testing the effect of thickness on stainless steel compatibility and of high temperatures on a range of alloys.

Our newsletter is regularly published. Today more than 200 subscribers receive it by e-mail, and countless others read it on the G-4 Web Site.

Our web site has also matured and helps those who need us to find us. Its potential for the future is “awesome.”

TABLE 3—*Keynote speakers*

1982—Robert Neary
1985—John Gilbertson
1987—Clyde McKinley
1989—Wolfgang Wegener
1991—Irvin Glassman
1993—Robert Lowrie
1995—Frank Benz
1997—Ulrich Koch
2000—Coleman Bryan

Our computer utilities aid oxygen compatibility (OC) practitioners in doing the drudge and minutia of OC practice.

Our education course is regularly offered to appreciative students worldwide. It has been given about 100 times to more than 2000 students worldwide and serves to introduce the OC subject to a wide audience, bolstering the validity of all of G-4’s products and its membership as well.

And that is not the end of G-4’s efforts. Today a CD-ROM manual of our publications is nearing completion and promising to make these data available into the indefinite future, databases are being developed, experimental test programs are underway or are in development, and much more. The solid

*(See **25 Years** on page 5)*

FIG. 3—The panoramic ASTM Committee G-4 as it existed in 1984 at a meeting in El Paso, TX.

*(**25 Years** from page 4)*
foundation of the first twenty five years has been the starting point for a vast amount of work yet to come.

However, it was not all vision and hard work. Despite a number of bumps and bruises and many airline meals, there were also many, many good times with good people in very interesting places. Table 5 lists our meeting sites and reflects the good tastes of our membership. Join G-4 and see the world!

Perhaps the entertainment high point was in 1995 when those who stayed over saw a stunning night-time launch of the Space Shuttle. How's that for a perk?

On other occasions, members dined atop Palm Springs' Mount San Jacinto mountain, strolled San Francisco's Hills, and most recently banqueted in the Eiffel Tower.

Among sites for G-4's meetings are five "international" sites: Cambridge England, Noordwijk Netherlands, Montreal and Toronto, Canada, and Paris France. OC has been handled in different ways in differing countries. Some countries take a voluntary approach, some countries take a regulatory approach, and in some emerging countries an approach has not been selected.

ASTM G-4 has from its first meeting been fortunate to have superb attendance and contribution from several members who have always endured international travel to participate. However, meetings held at international sites comprise only ten percent of the total number if locations where the committee has convened. This was, and still is, because the committee has always had to balance overall attendance, logistics, and practicality, resulting in most meetings being held in the US.

However, a conscious effort has been made to include international sites for our symposia, and three of the nine Symposia on Flammability and Sensitivity of Materials in Oxygen-Enriched Atmospheres have been held in Europe (Cambridge, Noordwijk, and Paris) to facilitate participation. Indeed, the Committee looks forward to its first symposium and meetings in the Pacific Rim.

From among the hero's heroes, G-4 has honored six of its own with the prestigious ASTM Award of Merit (for the superstars of standardization). These heroes are listed in Table 6.

Today G-4 enjoys the continued contributions of perhaps five of its charter members. However, the G-4 membership is at its highest level ever — currently exceeding 100 members — and a new generation of heroes is rooted therein.

G-4 has nearly completed a crucial transition to this next-generation of OC practitioners (heroes) who will shepherd it through the next 25 years.

TABLE 5—*Favorite Sites*

San Diego CA (6) 77,81,84,88,91,97
Cocoa Beach FL (4) 80,88,91,98
New Orleans LA (3) 77,86,90
Las Cruces NM (3) 78,89,99
Denver CO (3) 79,89,95
Orlando FL (2) 76,96
Atlanta GA (2) 78,98
San Francisco CA (2) 80,87
Phoenix AZ (2) 82,86
Palm Springs CA(2) 85,90
Seattle WA (2) 96,99
Philadelphia PA 75
Chicago IL 75
Fort Lauderdale FL 79
Savannah GA 81
Tampa FL 82
Jacksonville FL 83
San Antonio TX 83
El Paso TX 84
Washington DC 85
Cambridge, England 87
Houston TX 92
Miami FL 92
Noordwijk, Netherlands 93
Fort Worth TX 93
Montreal, Canada 94
Slidell MS 94
Norfolk VA 95
St Louis MO 97
Toronto, Canada 00
Paris, France 00

TABLE 6—*Awards of Merit*

1985—Coleman J, Bryan
1989—Barry L. Werley
1992—Joel M. Stoltzfus
1993—Robert E. Lowrie
1995—Ken McIlroy
1999—Ulrich Koch

On-Site at *Oxygen 2000*

L-R Barry Newton, Mike Yentzen, Elliot Forsyth, Whitney Forsyth, Bill Royals, Bob Jacobs, and Bryn Shoffstall

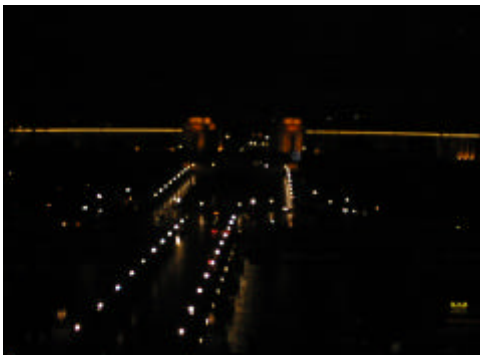
Renee and Barry Newton

L-R Michelle Barragan, Mrs. Bruce Wilson, Ted Steinberg, and Dr. Bruce Wilson

L-R Steve Mawn, Ted Steinberg, Herve Barthelemy, Barry Newton, and Harold Beeson

Mike and Bryn Shoffstall

Steve Mawn checks with the maitre'd on last-minute dinner details.



The Ecole Militaire as seen from the Eiffel Tower.

Leroy and Cindy Nelson

Jess and Carolyn Waller visit one of the gift shops before dinner.

Members of the European contingent enjoy dinner at the Eiffel Tower Altitude 100 Restaurant.

L-R Whitney Forsyth, Bryn Shoffstall, Renee Newton, Mike Shoffstall, Barry Newton and Elliot Forsyth share an elevator after dinner.

*(**Progress** from page 1)*

led by Ting Chou to evaluate the appropriateness and need for a fire limits standard or manual

Education G4.05 reported 18 students attended the onsite TPT course, and since the Spring '00 meeting, there were another 96 students who attended four other sessions. Seventy students attended in two sessions of the short course.

Bob Zawierucha (Praxair) made a presentation on metals flammability issues. It focused on the effect of cross sections (thick versus thin) versus flammability, updated flammability data on silicon bronze, and discussed the role of regulatory agencies and codes in design and materials selection for pipe and components.

Symposia G4.06 completed its long-awaited millennium symposium. Plans for the next one are in the works. Potential locations include Marshall Space Flight Center, AL, and Air Products in Allentown, PA.

Statistics G4.93 reported that scanning of STP Volumes 1 through 4 and Volume 8 have been completed and compiled as searchable CD-ROMs. Due to limitations of existing compression routines, only four volumes will be initially provided on a single CD-ROM. Volumes 4 through 7 are in works, but progress has been slowed because of font variations between papers and volumes.

Publicity G4.94 reported that Mark Levin has successfully located 200 email addresses for the newsletter distribution and has also revised the G-4 Member Info packet.

Lori Kubinski updated members on current and proposed enhancements to the G-4 website (See article on this page). Barry Werley will support her with the Fall 2000 *G-4 News*, after which she will assume full editorship. G-4 News is now distributed by e-mail only and is also posted on the G-4 website.

A 25-year history of G-4, written by Bob Lowrie, has been printed in booklet form and was distributed to the symposium dinner attendees and mailed to Committee Charter members. It will also be available on the G-4 website soon.

Executive Committee G4.90 received an offer from Marshall Space Flight Center to host the Fall 2002 G4 Meeting (and possibly the next Symposium) in Huntsville, AL. G4.90 also approved Ron Epstein and Ulrich Koch as candidates to the ASTM Nominating Committee. The initial draft of a fire limit standard submitted by Barry Werley was referred to the Practices Subcommittee to review and make a recommendation at the March 2001 meeting as to how the standard should be handled. Fourteen new applications for membership on the G-4 Committee were approved. Finally, G4.90 received an update on activities scheduled for G-4 members and spouses in conjunction with the G-4 business meeting and the 9th International Symposium in Paris.

G4N

Having a Problem Purchasing STPs?

Have you tried to buy any of G-4's ten Special Technical Publications at the ASTM Web Site Store? Its URL is http://www.astm.org/cgi-bin/SoftCart.exe/STORE/store.htm?E+mystore.

Some members report that of G-4's ten STPs, only STP 1111, 1267, 1319, and 1395 are listed using the Web Store search engine. This appears to be a computer glitch, and we are assured by ASTM that STPs 910, 986, 1040, 1181 (cleaning), and 1197 are all still available. Only STP 812 has gone out of print.

We recommend you phone the Customer Service directly at 610-832-9585 if this problem happens to you.

Barry Newton (Statistics Chair) is working to develop an ASTM Manual that will provide these collected works (including 812) on CD-ROM, but that may take a while yet.

G4N

Web Site Changes

Great things are in store for the G-4 web site, hosted by NASA WSTF. The site is undergoing major structural changes and is scheduled to be posted with a new web address (see p. 2) before the Spring 2001 G-4 business meeting,

The site was up for discussion at a recent meeting of WSTF's Configuration Control Committee, which has essentially given the site its blessing.

One addition to the web site is the publication of Appendix D of NFPA 53, "Recommended Practice on Materials, Equipment, and Systems Used in Oxygen-Enriched Atmospheres." The appendix contains narratives of oxygen incidents and provides the framework for a larger catalog of such incidents currently being compiled at NASA WSTF.

The incident catalog covers:

- Oxygen production, transportation, and transfer
- Medical
- Cutting and welding
- Industrial processing
- Laboratories
- Space
- Deep sea
- Others

G-4 members can contribute information on additional incidents by contacting G-4 Web Site liaison Lori Kubinski at lkubinsk@wstf.nasa.gov.

G4N

Want G-4 News?

G-4 News Is E-Mailed Only!

To request a free E-Subscription, e-mail your request to Mark Levin (mlevin@dscp.dla.mil). You will be added to G-4's publicly available database of oxygen compatibility enthusiasts. You may also cite your company, address, phone, fax and whether your classification is as a G-4 member, symposium attendee, TPT student, consultant, or commercial testing source, as well as enthusiast.

G-4 News and all of its back issues are available on the G-4 Web Site as downloadable Adobe Acrobat (.pdf) files at:

http://www.wstf.nasa.gov/Oxygen/ASTMG4/OldNews.htm

*(**Oxygen 2000** from page 1)*

plants. A chapter on miscellaneous topics ranges from a review and model analysis of metals flammability to an analysis of autoignition temperature round robin data.

STP 1395 was provided to all attendees on-site, something G-4 has achieved only one other time—at the previous symposium in 1997. Accomplishing this feat back-to-back is a quality habit the Committee is very proud to have developed.

9IS was attended by more than twice the oxygen practitioners than attended the Sixth International Symposium in Noordwijk, Netherlands, just seven years ago, indicating increased international interest.

The symposium and STP 1395 are superb technical successes. The compelling new results will continue to impress the OC community. They include new ways to assess oxidants, new success at bringing theory and practice together, and innovative new ways to test materials. One attendee called the event "wonderful."

And since this was only the third International site for this "International" series, its high success is, therefore, just that much sweeter. **G4N**

Harold Beeson (NASA WSTF) and Cole Bryan (NASA KSC) chat between dinner courses at the Eiffel Tower's Altitude 100 Restaurant last September.

Upcoming Meetings and Other Information

Regular meetings of ASTM Committee G-4 have been scheduled as follows:

Mar 28-29, 2001.....Phoenix, AZ
Sept 19-20, 2001.....Panama City, FL
Mar 13-14, 2002.....Pittsburgh, PA

Contact Steve Mawn (610) 832-9726 for details or membership data. ASTM membership is $65 per year.

The next G-4 Symposium is tentatively scheduled for either Marshall Space Flight Center, AL, or Air Products in Allentown, PA, to be held in 2002.

Public offerings of the course *Fire Hazards in Oxygen Systems* are planned for:

Mar 26-27, 2001.....Phoenix, AZ
Sept 17-18, 2001.....Panama City, FL

Cost is $675, including text. It can be offered at your site for a negotiated price. The two-volume course text *Fire Hazards in Oxygen Systems* may be ordered separately for $250. Sessions of the *Operation and Maintenance* course are also being scheduled. Call Scott Murphy (610) 832-9685 for information/ brochure for either course.

A 210-page compilation of 23 1997 ASTM Standards on oxygen safety is available, Stock #FIREHAZ ($68 in North America, $75 elsewhere), (610) 832-9585.

The G-4 Videotape *Oxygen Safety* PCN 12-700880-31 ($67 for members, $75 for nonmembers) may be ordered from ASTM Customer Service at (610) 832-9585.

All G-4 standards appear in part 14.04 of the ASTM Book of Standards or may be ordered individually from ASTM Customer Service (610) 832-9585 or at their website at www.astm.org. Typical standard prices range $15 to $30.

G-4's Manual 36, "*Safe Use of Oxygen and Oxygen Systems,*" is now available ($54 in North America, $60 elsewhere) from ASTM Customer Service (610) 832-9585 or at their website at www.astm.org.

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This newsletter is a product of ASTM Committee G-4. The editorial staff consists of the following Committee G-4 Officers and ASTM Staff:

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